What is claimed:

1. A method of manufacturing a monolithic stabilized electroabsorption modulator which includes a substrate with a top surface and substrate index of refraction; a waveguide layer with an output optical tap section and an electroabsorption section arranged along a longitudinal axis; and a semiconductor layer, the method comprising the steps of:

a) forming a waveguide layer having a waveguide index of refraction different from the substrate index of refraction on the top surface of the substrate, the waveguide layer including an electroabsorption portion adjacent to the output optical tap portion;

b) forming the semiconductor layer on the waveguide layer, the semiconductor layer including a semiconductor layer index of refraction different from the waveguide index of refraction;

c) defining and etching the waveguide layer and the semiconductor layer to form mesa structure;

d) depositing a base electrical contact on the substrate; and

e) depositing a modulator electrical contact and an output optical tap electrical contact on the semiconductor layer.

2. The method of claim 1, wherein step (a) further includes the step of forming a plurality of sub-layers in the electroabsorption portion of the waveguide layer to form a quantum well structure, each of the sub-layers including a waveguide material.

3. The method of claim 2, wherein step (a) further includes the steps of:

a1) forming at least one patterned growth retarding layer on the top surface of the substrate;

a2) forming the waveguide layer on a portion of the top surface of the substrate by selective area growth.

4. The method of claim 3, wherein the step of forming the patterned growth retarding layer includes forming a plurality of growth retarding elements, the growth retarding elements defining a channel extending along a central portion of the longitudinal axis.

5. The method of claim 3, wherein step c) further includes the step of removing the growth-retarding layer.

6. A method of stabilizing an extinction ratio of a monolithic stabilized electroabsorption modulator, including an input optical tap, an electroabsorption modulator, and an output optical tap, the method comprising the steps of:

a) supplying a bias voltage to the input optical tap, the electroabsorption modulator, and the output optical tap;

b) detecting an input tap current of the input optical tap and an output tap current of the output optical tap;

c) calculating the extinction ratio of the electroabsorption modulator based on the input tap current and the output tap current measured in step (b); and

d) varying the bias voltage based on the extinction ratio calculated in step (c) to maintain the extinction ratio approximately at a predetermined level.

7. The method of claim 6, wherein:

the monolithic stabilized electroabsorption modulator further includes a semiconductor optical amplifier; and

step (a) further includes the step of supplying an amplification current to the semiconductor optical amplifier.

8. The method of claim 7, wherein step (d) further includes the step of varying the amplification current based on the input tap current measured in step (b) to control the input tap current at a second predetermined level.

9. The method of claim 7, wherein:

step (a) further includes the steps of;

a1) supplying a DC amplification current to the semiconductor optical amplifier, the DC amplification current having a DC level;

a2) supplying an AC amplification current to the semiconductor optical amplifier, the AC amplification current having an AC level and an AC frequency;

step (b) further includes the step of synchronously detecting the input tap current and the output tap current at the AC frequency.

10. The method of claim 9, wherein step (d) further includes the step of varying the DC amplification current based on the input tap current measured in step (b) to maintain the input tap current approximately at a second predetermined level.

11. The method of claim 6, wherein:

step (a) further includes the steps of;

a1) supplying a DC bias voltage to the input optical tap, the electroabsorption modulator, and the output optical tap, the DC bias voltage having a DC voltage level;

a2) supplying an AC bias voltage to the input optical tap and the output optical tap, the AC bias voltage having an AC voltage level and a tap frequency;

step (b) further includes the step of synchronously detecting the input tap current and the output tap current at the tap frequency.

12. The method of claim 11, wherein step (a2) further comprises the step of supplying the AC bias voltage to the electroabsorption modulator.

13. The method of claim 6, wherein:

step (a) further includes the steps of;

a1) supplying a DC bias voltage to the input optical tap, the electroabsorption modulator, and the output optical tap, the DC bias voltage having a DC voltage level;

a2) supplying an AC bias voltage to the electroabsorption modulator, the AC bias voltage having an AC voltage level and a variation frequency;

step (b) further includes the step of synchronously detecting the input tap current and the output tap current at the variation frequency.

14. A method of stabilizing an extinction ratio of a monolithic stabilized electroabsorption modulator, including an electroabsorption modulator and an output optical tap, the method comprising the steps of:

a) supplying an input optical signal to the monolithic stabilized electroabsorption modulator;

b) supplying a bias voltage to the electroabsorption modulator and the output optical tap, the bias voltage having a voltage level;

c) generating a periodic variation in the input optical signal, the periodic variation having a variation amplitude and a variation frequency;

d) synchronously detecting an output tap current of the output optical tap at the variation frequency;

e) calculating the extinction ratio of the electroabsorption modulator based on the output tap current measured in step (d); and

f) varying the voltage level based on the extinction ratio calculated in step (e) to maintain the extinction ratio approximately at a predetermined level.

15. The method of claim 14, wherein step (c) includes the step of supplying an AC bias voltage to the electroabsorption modulator to generate the periodic variation in the input optical signal.

16. The method of claim 14, wherein:

the monolithic stabilized electroabsorption modulator further includes a semiconductor optical amplifier; and

step (b) further includes the step of supplying an amplification current to the semiconductor optical amplifier.

17. The method of claim 16, wherein step (f) further includes the step of varying the amplification current based on the tap current measured in step (d) to maintain the tap current approximately at a second predetermined level.

18. The method of claim 16, wherein step (c) includes the step of supplying an AC amplification current to the semiconductor optical amplifier to generate the periodic variation in the input optical signal.

19. The method of claim 18, wherein step (f) further includes the step of varying the DC amplification current based on the tap current measured in step (d) to control the tap current at a second predetermined level.

20. A method of stabilizing an extinction ratio of a monolithic stabilized electroabsorption modulator, including a temperature control element, a temperature sensor, an electroabsorption modulator, and an output optical tap, the method comprising the steps of:

a) supplying a bias voltage to the electroabsorption modulator and the output optical tap;

b) supplying a temperature control voltage to the temperature control element;

c) measuring a temperature of monolithic stabilized electroabsorption modulator using the temperature sensor;

d) varying the temperature control voltage based on the temperature measured in step (c) to regulate the temperature of monolithic stabilized electroabsorption modulator to an operating temperature;

e) detecting an output tap current of the output optical tap;

f) calculating the extinction ratio of the electroabsorption modulator based on the output tap current measured in step (e); and

g) varying the operating temperature based on the extinction ratio calculated in step (f) to control the extinction ratio at a predetermined level.

21. The method of claim 20, further comprising the step of:

h) varying the bias voltage based on the extinction ratio calculated in step (f) to control the extinction ratio at a predetermined level.

22. The method of claim 21, wherein:

the monolithic stabilized electroabsorption modulator further includes an input optical tap;

step (a) further includes the step of supplying the bias voltage to the input optical tap;

step (e) further includes the step of detecting an input tap current of the input optical tap; and

step (f) includes the step of calculating the extinction ratio of the electroabsorption modulator based on the input tap current and the output tap current measured in step (e)